

AUTOMOTIVE SYSTEM RELIABILITY SIMULATION SOFTWARE

Animesh Dey, Robert Tryon, and Loren Nasser
VEXTEC Corporation,
Brentwood, TN 37027

Richard Rudy and Marlon Forrest
DaimlerChrysler Corporation
Auburn Hills, MI 48326

Reliability assessment plays an important role during automobile concept development to determine whether a design meets predicted warranty goals. This paper presents Sim SARRS – System simulation software allowing the automotive designer to predict repairable system incidents during product development.

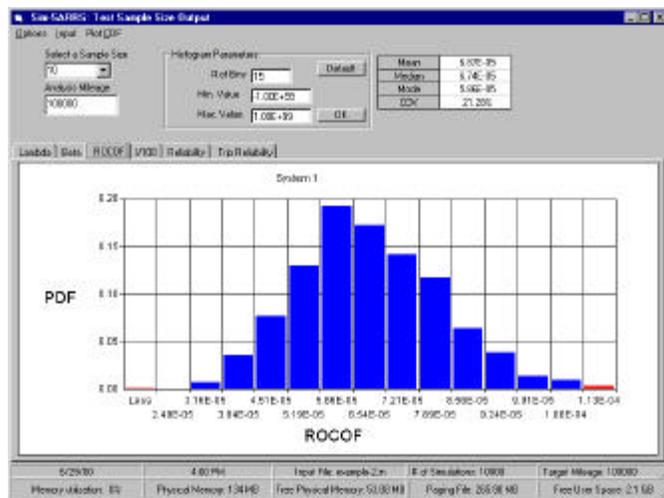


Figure 1: Sim SARRS – System Software

The software uses Monte Carlo simulation to virtually test many systems. The input to the simulation includes the number of systems under test, the target mileage and the statistical distribution of incidents for each component in the system. The simulation produces the same data that is produced in an actual test i.e., the incident times (mileage) for each system. The software then uses the Non-Homogeneous Poisson Process (NHPP) to determine the repairable systems reliability [1]. The output of the software also includes rate of occurrence of failure (ROCOF), incidents per 100 (I/100), reliability and the trip reliability.

The software allows for the calculation of the intensity function parameters and the associated reliability measures in two different ways. The first method considers the test as a single ensemble of systems i.e., if there are 4000 systems under simulated test, then one set of intensity function parameters and the associated reliability measures are determined for all 4000 systems. The second method allows the user to group the systems into smaller test sample sizes to allow for multiple groups i.e., the 4000 systems under simulated test can be grouped into 400 groups of 10 systems each. The intensity function parameters and the associated reliability measures is found for each group to produce 400 sets of output. The PDF and CDF of the intensity function parameters and the associated reliability measures are then determined.

Reference:

1. Lu, M-W, and Rudy, R. J., “Vehicle or System Reliability Assessment Procedure”, Chrysler Corporation.